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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/758,611

01/14/2004

David A. Stewart

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NASA AMES RESEARCH CENTER  
ATTN: PATENT COUNSEL  
MAIL STOP 202A-4  
MOFFETT FIELD, CA 94035-1000

EXAMINER

LANGMAN, JONATHAN C

ART UNIT

PAPER NUMBER

1775

MAIL DATE

DELIVERY MODE

08/08/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	Application No.	Applicant(s)	
	10/758,611	STEWART ET AL.	
	Examiner	Art Unit	
	Jonathan C. Langman	1775	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 05 June 2007.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1,3,4,6 and 9-12 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,3,4,6 and 9-12 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Specification***

The disclosure is objected to because of the following informalities: in paragraph [0033] the applicant is suggested to amend the “\_m” to read “micrometers”, “microns” or “ $\mu\text{m}$ ”.

Appropriate correction is required.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1, 3, 4, 6, and 9-12 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter, which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

All the subject matter up to line 5, page 2 of claim 1, can be found within the original specification. However, the applicant states, “... and are chosen to provide a coefficient of thermal expansion for the second, layer for which the thermal expansion coefficient difference for the functional gradient first layer and second layer is smaller than a difference that would be present between the coefficients of thermal expansion for the first layer and for the second layer in the absence of the functional gradient first

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layer and second layer", aside from this rambling not making any sense to the Examiner, there is no support for this statement found within the specification. The closest support the Examiner found was in paragraph [0026] where the applicant states "the sub layers preferably closely matches the coefficient of the thermal expansion of the substrate while subsequent layers may be used to increase the density and CTE of the coating." In this statement the CTE of the first layer matches the CTE of the substrate, however, the second layer, (fourth, fifth, and sixth percentages) are adjusted to make the CTE higher than the first layer. Furthermore, another teaching in paragraph [0035] shows "the composition of the coating is adjusted such that its coefficient of thermal expansion after sintering substantially matches the CTE of the underlying substrate", this coating 510, is only interpreted as a singular coating (first layer), there is no way to derive from this previous statement that the "coefficient of thermal expansion for the second, layer for which the thermal expansion coefficient difference for the functional gradient first layer and second layer is smaller than a difference that would be present between the coefficients of thermal expansion for the first layer and for the second layer in the absence of the functional gradient first layer and second layer."

By omitting this statement, mentioned above from the claim, thus making the claim **broad**, the claim will meet the requirements of 112 1<sup>st</sup> paragraph.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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Claims 1, 3, 4, 6, and 9-12 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

**Claim 1:**

Line 7: it is redundant for the applicant to state the new amendment "and a second layer of material" because this is mentioned in line 9. The examiner suggests deleting the phrase "and a second layer of material" from line 7 for clarity.

Line 9: recites the limitation "the substrate exposed surface" in line 9. There is insufficient antecedent basis for this limitation in the claim. This means that there was no mention of a first layer material prior to the inclusion of this limitation. To fix this error, the Examiner suggests adding this limitation to line 2, it may read something like this "a porous substrate with a lower surface and a upper surface". Then in line 9, the applicant may state "between the substrate upper surface and a second layer of material".

Line 9: there is a grammatical error in the amendment. The statement reads "a second layer with material composition different...". The Examiner suggests this amendment; "'a second layer with a material composition different...".

Line 10. This new amendment is unclear. The examiner suggests adding a period in line 10 after "composition different from the first layer.", and a few other changes to clear up this amendment. The Examiner suggests, the next few lines, starting from line 9, might read "a second layer with a material composition different from the first layer, ~~the second sub layer, with the first and second layers and the~~

~~substrate forming a functional gradient system wherein, the composite structure~~  
forms a functionally gradient system that gradually transitions from a first composition in the....”.

Page Two, claim 1, lines 5-11: it is unclear as to what the applicant is trying to state in “... and are chosen to provide a coefficient of thermal expansion for the second layer for which the thermal expansion coefficient difference for the functional gradient first layer and second layer is smaller than a difference that would be present between the coefficients of thermal expansion for the first layer and for the second layer in the absence of the functional gradient first layer and second layer”. For reasons stated above, with dealing with the 112 1<sup>st</sup> paragraph, by omitting this statement, the applicant will also overcome the 112 2<sup>nd</sup> rejection.

**Claim 3:**

Claim 3 recites the limitation "said layer" in line 2. It is unclear as to which layer the applicant is talking about. From the specification, it seems that any layer (first or second) may further comprise a processing aid. If this is how the applicant wants this to be interpreted, then the Examiner suggests that the claim read “wherein said first and/or second layers further comprise a processing aid”.

**Claim 6:**

In claim 6, the applicant states that the first layer comprises “at least 5 percent MoSi<sub>2</sub>”, however, this renders claim 6 indefinite, because the dependent claim 1, states

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that the  $\text{MoSi}_2$  ranges between 1 and 30 percent. Therefore, it is unclear as to how the  $\text{MoSi}_2$  may now be in the range of 31-100% (at least 5). The applicant is suggested to put an endpoint on the range stated in claim 6 for  $\text{MoSi}_2$ , that is less than or equal to 30, for the claim to be rendered definite.

### ***Response to Arguments***

Applicants' amendments to claims 1, 3, 4, 6, and 9-12 are noted, however they raise new 112 rejections, as shown above.

Applicant's arguments with respect to claim 1, 3-4, 6, and 9-12 have been considered but are moot in view of the new ground(s) of rejection.

### ***Allowable Subject Matter***

The following is a statement of reasons for the indication of allowable subject matter: the prior art of record does not teach:

A composite structure, comprising:

a porous substrate, with an upper and a lower surface, comprising a selected substrate material and having a substrate coefficient of thermal expansion;

a first layer of material integrated with an exposed surface of the substrate, wherein the first layer material comprises between 5 percent and 70 percent tantalum disilicide, between 1 percent and 30 percent molybdenum disilicide, and between 10 percent and 95 percent borosilicate glass, with the first layer being positioned adjacent

to and between the substrate upper surface and a second layer with material composition different from the first layer;

wherein the composite structure forms a functionally gradient system, that gradually transitions from a first composition in the substrate to a second composition in the first layer to a third composition in the second layer;

wherein the first layer material comprises a first non-zero percentage of tantalum disilicide, a second non-zero percentage of molybdenum disilicide and a third non-zero percentage of borosilicate glass, the second layer material comprises a fourth non-zero percentage of tantalum disilicide, a fifth non-zero percentage of molybdenum disilicide and a sixth non-zero percentage of borosilicate glass, and

wherein the first, second and third percentages are chosen so that a coefficient of thermal expansion of the first layer is substantially the same as the substrate coefficient of thermal expansion, and

wherein the fourth, fifth and sixth percentages are chosen to provide a protective layer when exposed to temperatures up to at least 3000 °F.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jonathan C. Langman whose telephone number is 571-272-4811. The examiner can normally be reached on Mon-Fri 9:00 am - 4:30 pm EST.



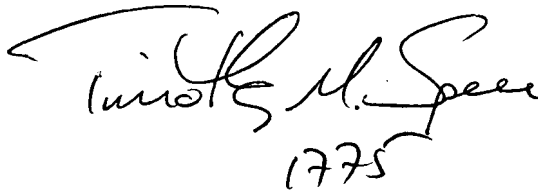
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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jennifer McNeil can be reached on 571-272-1540. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



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